The Rolleiflex

The Rolleiflex SL35, Fig. 1, heralds Rollei's entry into the 35mm single-lens reflex market. A 35mm SLR tops off the list of different camera types to supplement the classic Rolleiflex twin-lens reflex — a list which includes the SL66, the tiny 35mm Rollei 35, and the distinctly different 126mm drop-in loading SLR, the SL26.

As you would expect from Rollei, the SL35 is a beautifully engineered camera. But unlike Rollei's other ventures into different camera categories, the SL35 is neither a revolutionary nor an unusual design. Rather, it seems Rolleiflex has capitalized on standard and time-proven SLR features — and then added their own innovative touches to build a camera worthy of the Rolleiflex name.

Standard features include the double-roller focal-plane shutter and the electrically cross-coupled CdS exposure meter. The exposure meter reads through the lens at stopped-down aperture. Just hold down the large switch button, Fig. 1, to both stop down the lens and activate the exposure meter. Then, turn either the diaphragm control ring or the shutter speed knob, centering the needle within a U-shaped indicator on the focusing screen.

Some people, we're told, object to having to hold down the exposure meter switch button while taking a reading. But we found the switch button to be conveniently located, much more so than in many designs. And the fact that the switch button doesn't latch in the "down" position should eliminate excessive battery drain.

The plastic exposure meter switch button is actually Delrin, a tough, long-lasting plastic used extensively in the SL35. The use of Delrin throughout the camera, as in the SL26 and the Rollei 35, contributes to one of the SL35's blue-chip characteristics: the exceptionally light weight. With the standard lens (a 50mm f/1.8 Planar, no less), the camera weighs less than 28 ounces.

Other lenses available for the SL35 range from the 25mm Distagon to the 200mm Tele-Tessar, for a total selection of six lenses. Although that selection may seem rather limited, the range is extended by the M 42-1 adapter which allows the use of lenses having a Pentax screw mount. Remove the lens from the bayonet mount by first depressing the red button at the side of the lens standard, Fig. 2.

Not all of Rollei's quality touches are immediately apparent — and many show up in unexpected places. The slim wind lever, for example, may seem a trifle anemic at first glance, Fig. 3. But a look under the retaining screw emphasizes that Rollei goes beyond

Figure 1

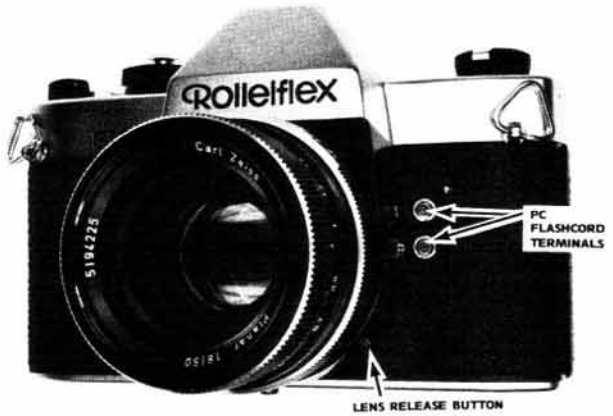


Figure 2

Figure 3

SL35

The cooperation of Rollei of America is gratefully acknowledged.

normal expectations. A spring-loaded ball detent, rather than a friction spring, provides the two wind lever positions: all the way in, the "storage" position, and extended from the camera body, the "ready" position.

Another subtle refinement is the return operation of the counter dial. As with many cameras, pulling up the rewind knob opens the back and allows the counter dial to return. The difference in the SL35 is that the counter dial disengages as you pull up the rewind knob — not as you swing open the back. So there's no sensing pin or lever extending through the light-trap material to engage the back, an entranceway for dirt in many designs.

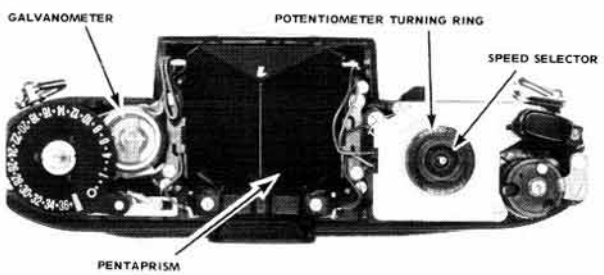


Figure 4

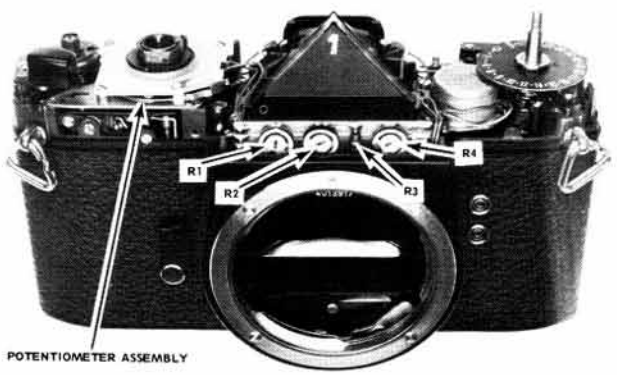


Figure 5

Exposure meter system

The electrically cross-coupled exposure meter is a designer's gift to the camera repair technician. Disassembly is straightforward, and there are no complex timing considerations on reassembly.

When you replace the speed knob components, just make certain each part keys properly to its mate. The slot on the underside of the speed knob must fit over the tab on the potentiometer turning ring, Fig. 4. Then, install the compression spring and the film speed calibration plate — the pin on the underside of the film speed calibration plate passes into the hole in the speed knob. And finally, using "bulb" as a reference setting, replace the shutter speed calibration plate with its two slots keying over the two studs on the speed selector.

At first glance, the balanced-bridge exposure meter may look quite familiar, Fig. 4. But again, Rollei offers its own special touches to a long-standing design. For example, there are three trim pots for fine adjustments, Fig. 5 — two more than in the Spotmatic's balanced-bridge system. And although the two CdS cells occupy the conventional positions (looking through the pentaprism to the focusing screen), they are angled slightly to provide a center-weighted reading.

The potentiometer assembly sits to the left of the pentaprism in Fig. 5. Changing either the film speed setting (lift and turn the speed knob) or the shutter speed setting (just turn the speed knob) positions the potentiometer turning ring. The result is to vary the electrical resistance in the exposure meter circuit.

When the exposure meter is turned off, the needle rests slightly off-center — just above the U-shape of the mask. Here, Rollei has profited from the mistakes of others; if the needle centered in the off position, the user may think that the shutter variables are correctly set for the proper exposure when he has actually forgotten to turn on the meter. Since a slight current is required to center the needle, the circuit may more properly be termed, "a biased-bridge exposure meter."

Closing the battery switch may send the current through the galvanometer in either direction, depending on the resistance of the CdS cells and the

THE ROLLEIFLEX SL35

setting of the potentiometer, Fig. 6. If too much current flows from left to right through the galvanometer, the needle deflects toward the bottom of the focusing screen (as seen through the pentaprism). And if too much current flows from right to left, the needle deflects toward the top of the screen.

You can then set the shutter speed to balance the resistance of the potentiometer against the resistance of the CdS cells. For example, say the needle deflects toward the bottom of the focusing screen. That means you can set a longer exposure time to increase the resistance between point B in the schematic and the lower end of the potentiometer. Alternately, you can set a larger aperture to decrease the resistance of the CdS cells.

From the technician's vantage point, the three adjustment pots are a real blessing. Rollei even went so far as to color-code each pot. The center pot (R2), having a dab of red paint, is in series with the CdS cells for a total-response adjustment. And the other two pots, each having a dab of brown paint, correct the linearity over the full range of meter response.

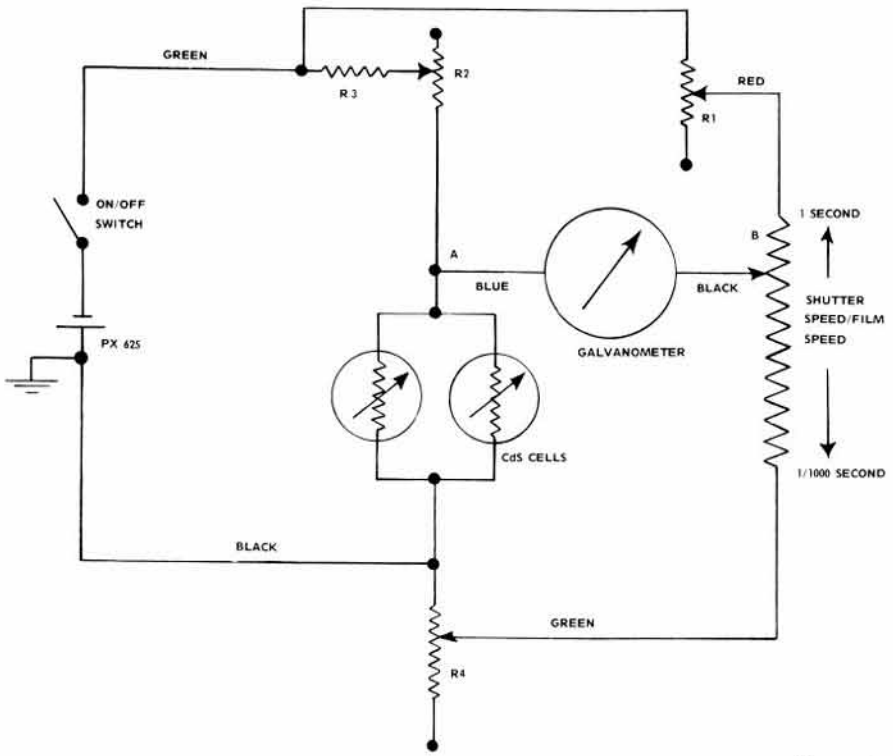


Figure 6

Optical adjustments in the SL35

Like the exposure meter adjustment points, the optical adjustments reflect Rollei's consideration for the repairman. You can make both the focusing screen and mirror angle adjustments with the camera lens in place — a big time-saver over systems that require removing the lens every time you make an adjustment.

The mirror angle adjustment, in fact, requires no disassembly at all. With the shutter held open on "bulb," the mirror angle setscrew with its locking collar is visible through the focal-plane aperture, Fig. 7.

However, you normally won't have to worry about the mirror angle adjustment — there's little reason for this adjustment to be incorrect. The focusing screen adjustment, on the other hand, may be disturbed when you disassemble the focusing screen components. Here, you can easily reach the adjustments with the top cover plate removed.

After you've verified that the lens focuses properly at the focal plane, check the focus on the Fresnel lens. If necessary, raise or lower the focusing screen by turning the adjusting

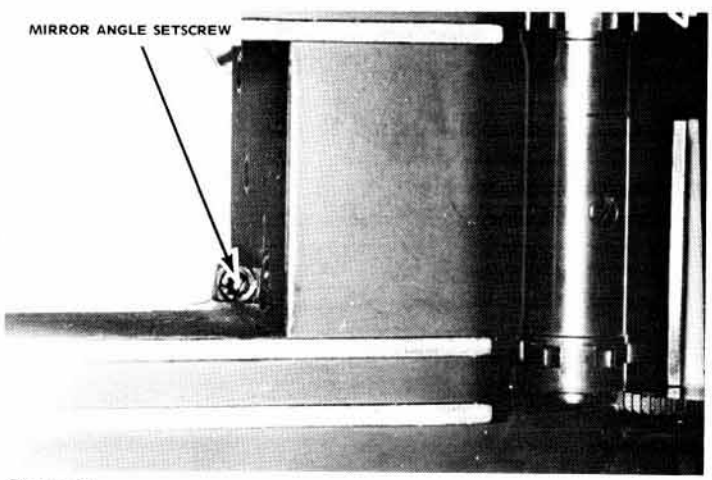


Figure 7

screws pointed out in Fig. 8. Since there are adjustments at three corners, you can adjust the focus all the way across the focusing screen — at the corners as well as at the center.

The remaining optical adjustment is the parallelism of the lens mounting ring with the focal plane. As with many cameras, spacers under the front plate at the screw hole positions control the parallelism. Although we mentioned this adjustment last, you should normally check it first — even before you begin disassembly. If the camera flunks the parallelism test, you can usually infer that it has been dropped or otherwise abused.

Shutter in the Rolleiflex SL35

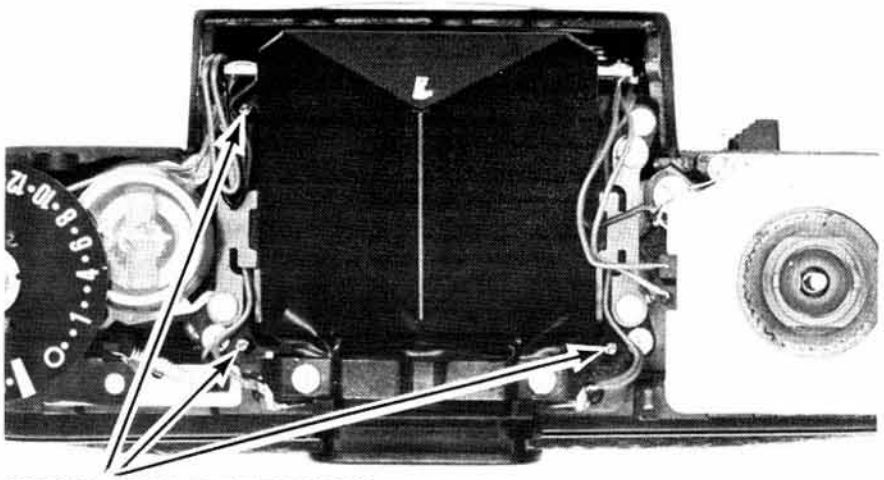
In many respects, the SL35 shutter conforms to traditional double-roller design. However, there are several commendable variations.

For one thing, Rollei uses a unique method of retaining the tensions on the take-up rollers. As seen from the bottom of the camera, Fig. 9, each take-up roller uses a slip spring to retain the adjustment. The adjusting nut on the end of each take-up roller turns easily in one direction, when adding tension. But the slip springs prevent the take-up rollers from turning in the opposite direction and letting off the tensions. As an additional precaution, a wire connecting the two screwdriver slots locks the adjusting nuts in position.

Adjusting the initial tensions on the take-up rollers is quite convenient. Whether adding or letting off tension, first remove the locking wire. Then, to add tension, turn the appropriate adjusting nut in a counterclockwise direction. To let off tension, hold the free end of the slip spring against its tension and turn the nut in a clockwise direction. If you're setting up the tensions from scratch, adjust the opening curtain travel time first — the opening curtain in our test camera clocked in at a quite-fast 11.5 milliseconds.

The other parts on the bottom of the camera are the mirror cocking and returning mechanisms and the exposure meter switch linkage. As you cock the shutter, the mirror cocking lever drives the mirror tensioning lever toward the front of the camera. The mirror tensioning lever then latches in position to retain the tension on the mirror lifting spring, as shown in Fig. 10.

Depressing the release button releases the mirror. But here's one



FOCUSING SCREEN ADJUSTING SCREWS

Figure 8

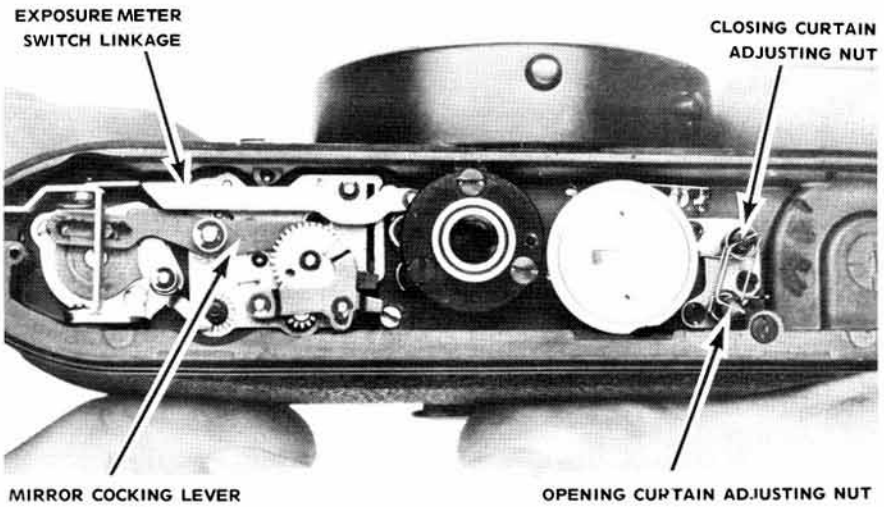


Figure 9

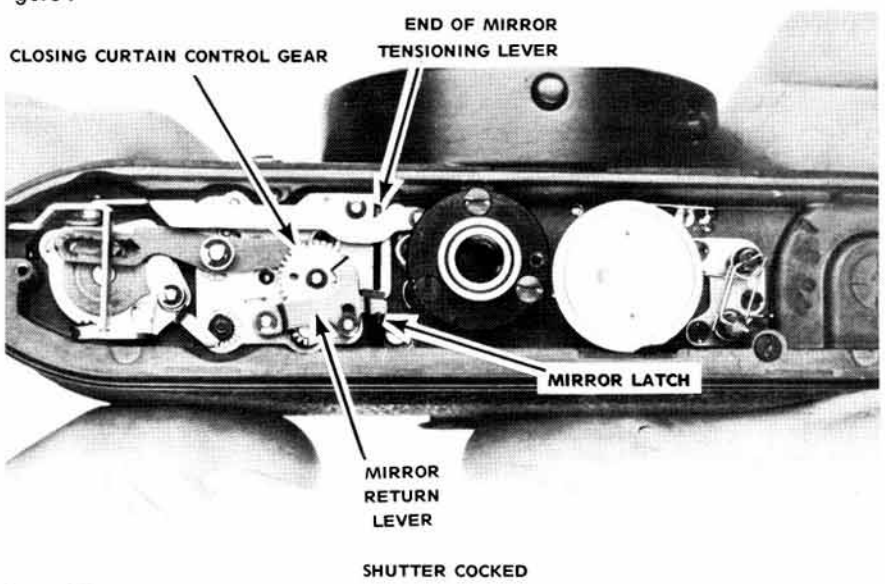


Figure 10

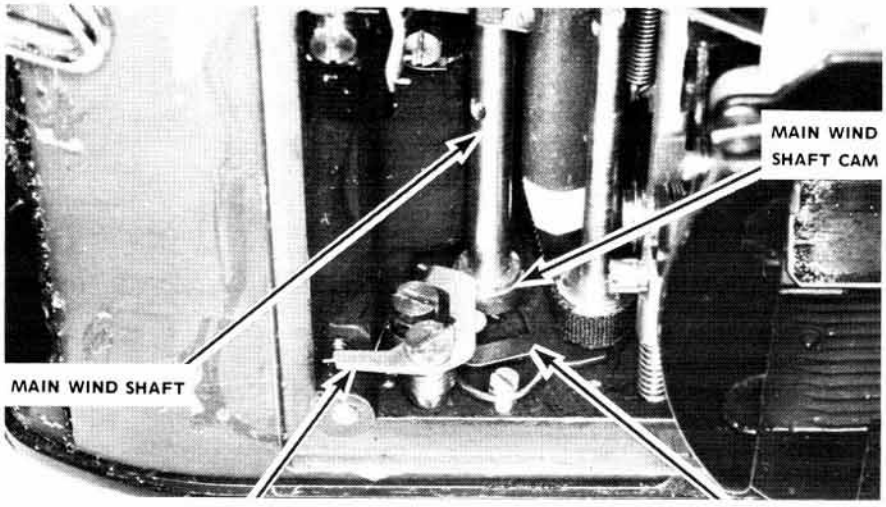


Figure 11

switch from the traditional double-roller SLR design: the opening curtain latch, which holds back the curtains until the mirror clears the aperture, sits at the bottom of the camera, Fig. 11. In the cocked position, the opening curtain latch engages a cam at the bottom of the main wind shaft. And the upper end of the main wind shaft carries both the opening and closing curtain wind gears, the gears which engage the curtain-winding rollers.

As the mirror moves to the taking position, the opening curtain striker (on the mirror cage) disengages the opening curtain latch. The opening curtain wind gear, attached to the upper end of the main wind shaft, is now free to rotate as the opening curtain starts across the aperture. Then, at a time determined by the speed setting, a cam mounted on the opening curtain wind gear releases the closing curtain latch to free the closing curtain wind gear.

At the end of the exposure, the closing curtain control gear, Fig. 10, strikes the mirror return lever. And the mirror return lever strikes the mirror latch. Now, the mirror tensioning lever is disengaged and the mirror returns to the viewing position.

The cam at the bottom of the main wind shaft has a couple of other functions in the shutter. For one, it strikes the opening curtain brake lever, Fig. 11, as the opening curtain nears the closing side of the focal-plane aperture. And a special award should go to Rollei for their thoughtful design of the brake adjustment — you don't even have to disassemble the camera to reach the adjustment point. A setscrew, accessible from the back of the camera in Fig. 12, controls the position of the brake lever. If, for example, the opening curtain bounces open at the end of the exposure, you can back out the setscrew in a counterclockwise direction to increase the amount of braking action.

A third function of the main wind shaft cam is to stop the wind lever at the end of the cocking stroke. As you hold the wind lever fully advanced, the cam strikes a stop pin on the bottom of the camera, Fig. 13 (shown with the opening curtain brake lever removed). Then, when you let go of the wind lever, the cam recoils slightly — the slight gap between the cam and the stop pin, shown in Fig. 13, represents the overtravel necessary for the opening curtain latch to drop into position.

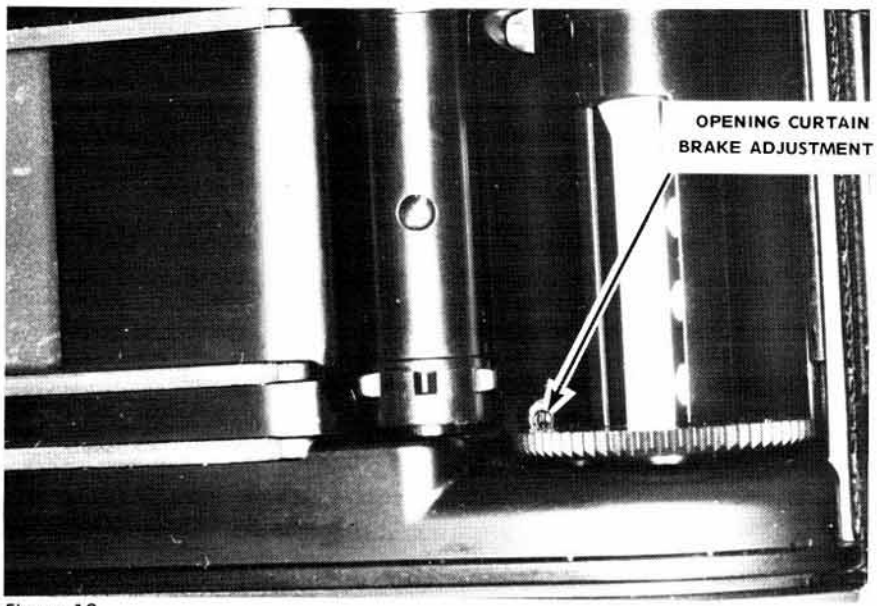


Figure 12

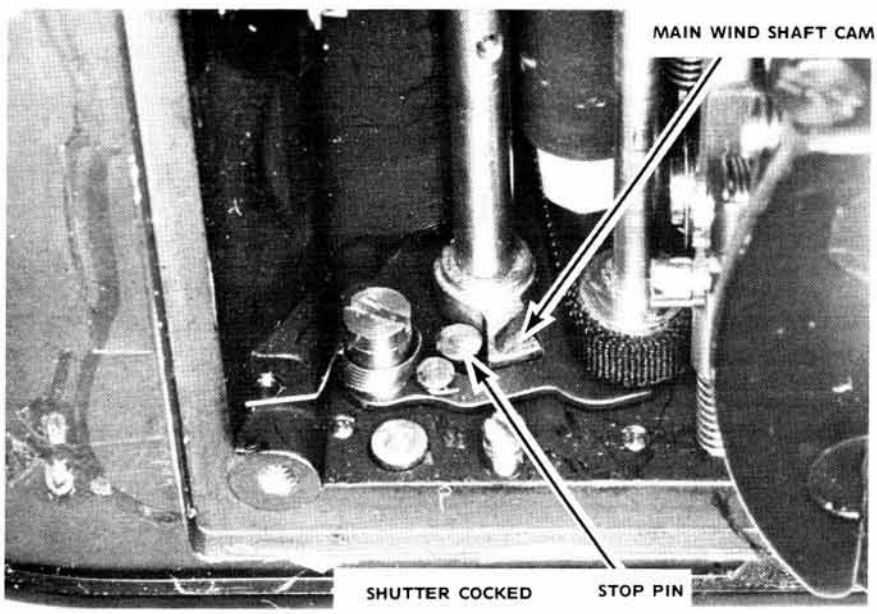


Figure 13

With the wind lever fully advanced, the cocking cam at the top of the camera, Fig. 14, is also arrested when it comes against its stop plate. Most ideally, it seems, the two cams should strike their respective stops simultaneously. Or, as a compromise, the main wind shaft cam should strike the stop pin slightly before the cocking cam reaches the stop plate. But if the cocking cam strikes first, thereby preventing the wind shaft cam from reaching its stop pin, there may not be sufficient overtravel for the opening curtain latch to drop into engagement.

This timing relationship between the two cams is an important consideration if you disassemble the upper gear train. For example, say that you've reassembled the camera and find that it takes two wind lever strokes to cock the shutter — or, when you depress the release, both curtains fire across at the same time. In either event, the timing between the main wind gear and the intermediate reduction gear, Fig. 14, is at fault.

We've mentioned the cam sequence to point out another example of Rollei's consideration in the adjustment department. The cocking cam is actually in two sections, and an eccentric controls the relationship between the two sections. For a fine adjustment, if you can't get the proper sequence with the gear timing, you can adjust the eccentric. Make the adjustment by first allowing the wind lever return spring to unwind; then loosen the cocking cam screws. You can now turn the eccentric to precisely correct the relationship between the cocking cam and the wind shaft cam.

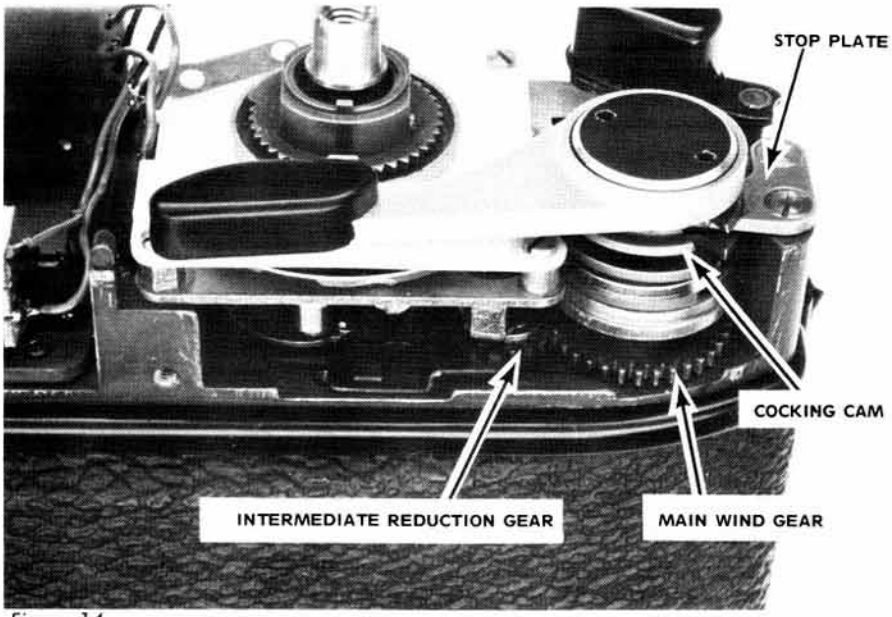


Figure 14

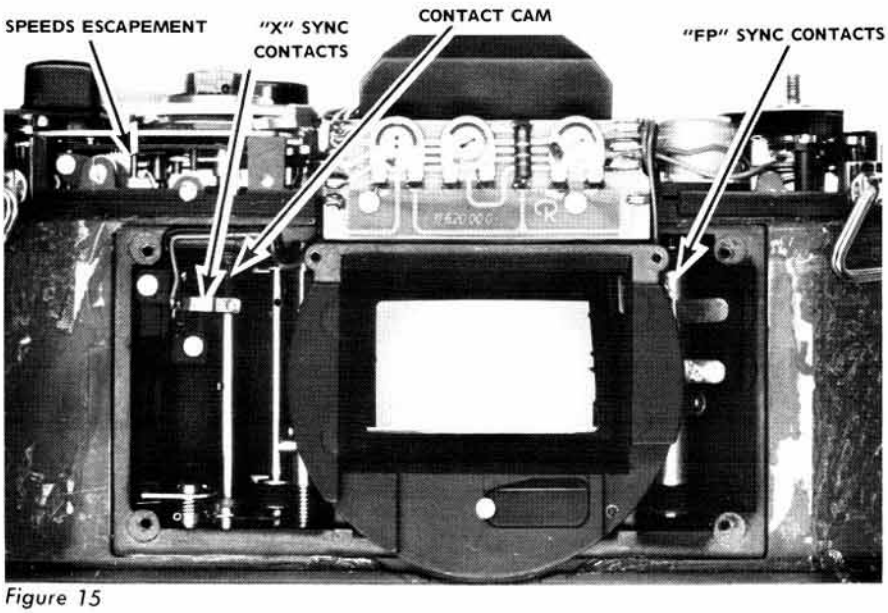


Figure 15

Flash synchronization in the SL35

Since we've removed the front plate, the flash sync mechanisms are clearly visible. The SL35 provides both "X" sync and "FP" sync on every release cycle. Select the desired sync action by attaching the flashcord to the appropriate PC terminal on the front plate.

The "X" sync contacts, shown in Fig. 15, are controlled by another cam attached to the main wind shaft — a logical position, since the main wind shaft always turns with the opening curtain wind gear. In the shutter-released position, the contact cam holds the "X" sync contacts closed. The contacts then open as you cock the shutter and close again as the opening curtain reaches the closing side of the focal-plane aperture.

But the "X" flash sync circuit is only complete when the mirror is in the taking position. In the viewing position, the open "FP" contacts on the mirror cage, Fig. 15, act as a safety switch for the "X" sync circuit. Then, as the mirror rises to the taking position, it closes the "FP" sync contacts — both closing the safety switch (if you're hooked to the "X" PC terminal) and providing a 16 millisecond sync delay (if you're hooked to the "FP" terminal). The schematic, Fig. 16, shows the sync circuits.

Slow-speed and slit-width adjustments

One of the first SL35 quality touches you'll notice is the exceptionally quiet operation of the slow speeds. The speeds escapement is a highly refined module sitting at the top of the camera, Fig. 15. This position eliminates the linkage system necessary in many focal-plane SLR's to connect the retard lever to the closing curtain wind gear.

Changing the shutter speeds within the range of 1 second through 1/30 second varies the depth that the retard lever engages the closing curtain wind gear. At 1/60 second, the fastest full-aperture speed, the retard lever is held out of engagement. The pallet in the speeds escapement engages the star wheel only at the

three slowest speeds — 1 second, 1/2 second, and 1/4 second.

Shutter speed adjustment points for both the slit-width speeds and the retard speeds are at the back of the camera, Fig. 17. The slit-width adjustment on the high-speed cam follower controls the position of the disengaging lever, the lever that kicks out the closing curtain latch to free the closing curtain. To adjust the fast speeds, just loosen the locking collar and turn the setscrew in or out — in for a faster speed and out for a slower speed.

The slow-speed adjustment is the eccentric pivot of the slow-speed cam follower. Turning the hexagonal portion of the eccentric, Fig. 17, varies the amount of retard lever engagement. The key speed for adjusting the retard engagement is 1/4 second, the fastest speed with the pallet engaged.

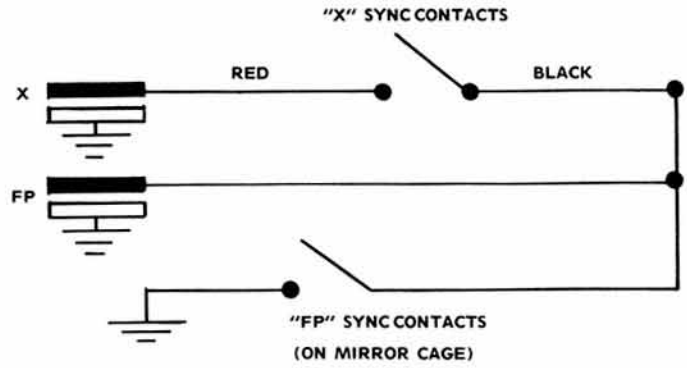


Figure 16

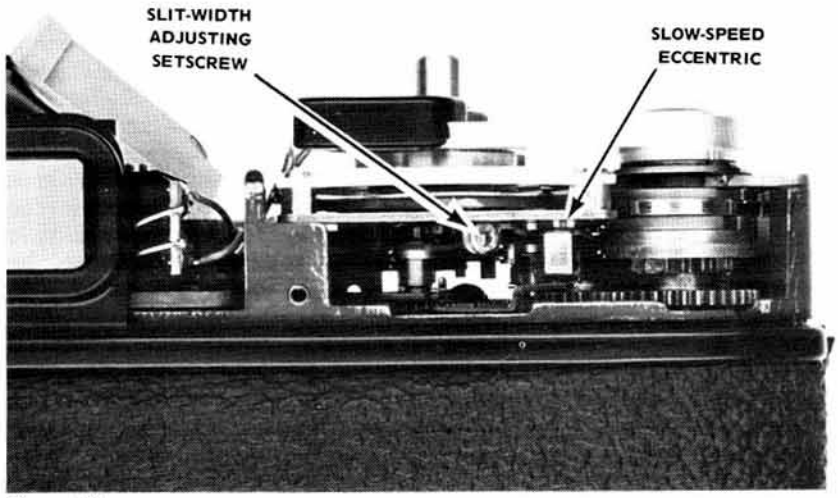


Figure 17

There's another adjustment within the camera that affects the slit width. An eccentric stud on the opening curtain wind gear controls the position of the cam that strikes the disengaging lever. However, this eccentric isn't accessible with the camera assembled — we must first remove the shutter speed control bridge and the potentiometer assembly.

Removing the shutter speed control bridge

Both the potentiometer assembly and the shutter speed control bridge are conveniently removed as a unit. First, unsolder the three exposure meter wires connected to the potentiometer assembly — the black wire which goes to the brush and the red and green wires which go to the potentiometer terminals.

Next, remove the three screws holding the potentiometer assembly. You can now rotate the potentiometer assembly far enough to reach the three screws holding the shutter speed control bridge — two screwdriver-slotted screws and the screw with a hexagonal head that also serves as a support post for the potentiometer assembly, Fig. 18. Finally, lift off the shutter speed control bridge along with the potentiometer.

On the underside of the shutter speed control bridge, Fig. 19, you can see the speed control cams and the cam followers. The disengaging lever, also pointed out in Fig. 19, hooks on the pin of the closing curtain latch, Fig. 20. When replacing the shutter

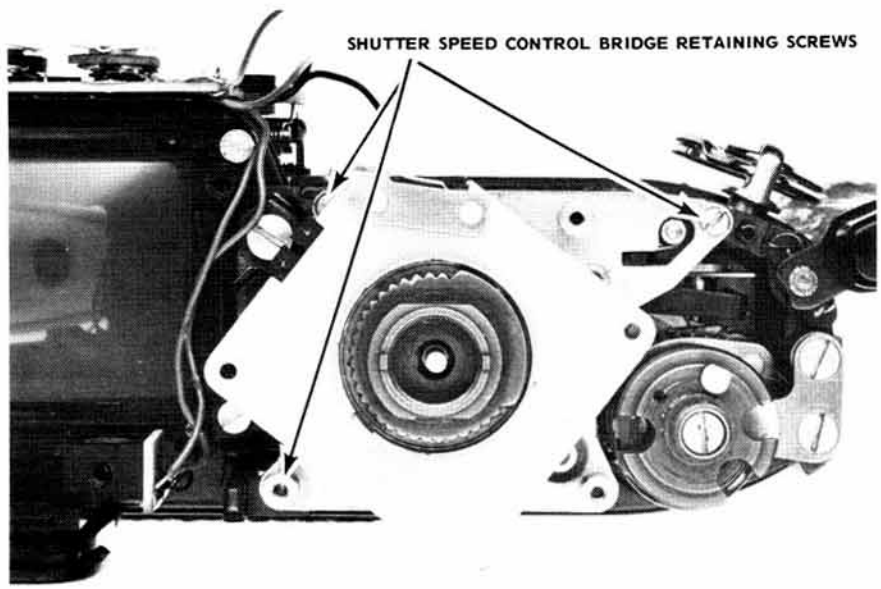


Figure 18

speed control bridge, you must push the disengaging lever against its spring tension so it fits between the pin (on the closing curtain latch) and the release cam.

There are a couple of other precautions in replacing the shutter speed control bridge. First, make sure that the downward-projecting end of the pallet cam follower hooks to the front of the upturned tab on the pallet control lever, Fig. 20. Also, as you're seating the bridge, push the retard lever, Fig. 20, against its spring tension — the retard lever must hook to the pin on the slow-speed cam follower and ride within the cutout in the shutter speed control bridge post.

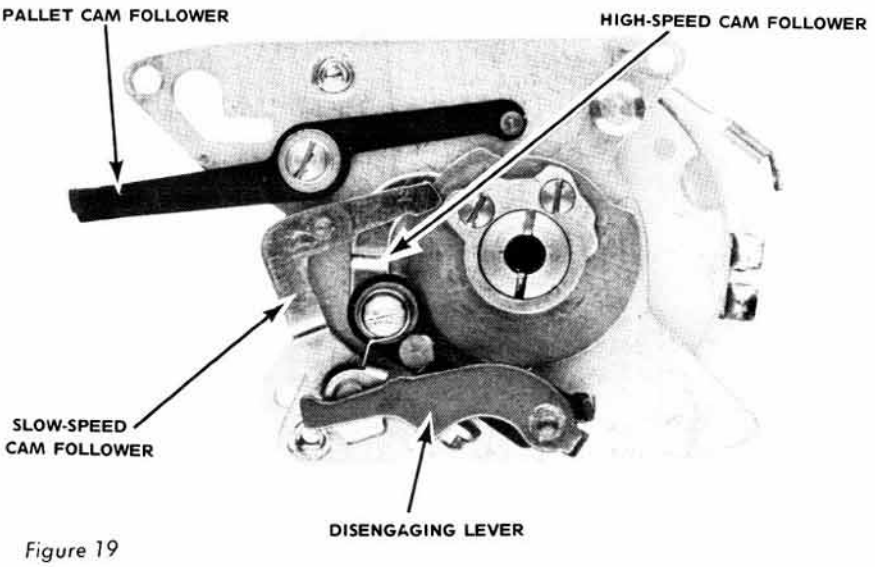


Figure 19

Removing the mirror cage in the SL35

Most of the disassembly and reassembly procedures in the SL35 are pretty straightforward — if you're familiar with basic double-roller design, you shouldn't have much trouble. However, one procedure we found a trifle tricky and worth passing along involves removing and replacing the mirror cage.

The parts must be in a certain position before the mirror cage will go into or out of the camera body. Several parts must first be removed, many of which are held by E-rings — and E-rings are not always the delight of the camera repair technician.

First, it's necessary to remove the viewfinder frame and exposure meter assembly. So unsolder the two battery wires — the green wire which connects to the battery switch and the black wire which connects to the battery contact at the bottom of the camera. Then, remove the serial number plate from the front of the mirror cage and the two screws that hold the circuit board along with the circuit board insulators.

Four screws hold the viewfinder frame and exposure meter assembly. However, the film counter dial wants to get in the way as you're lifting out the assembly. So remove the counter dial (held by a retaining ring) with its return spring. Then, remove the four screws and lift out the viewfinder frame complete with the galvanometer, pushing the film counter actuator lever out of the way for clearance.

The focusing screen parts are now loose within the mirror cage. Lift out the compression springs (for the

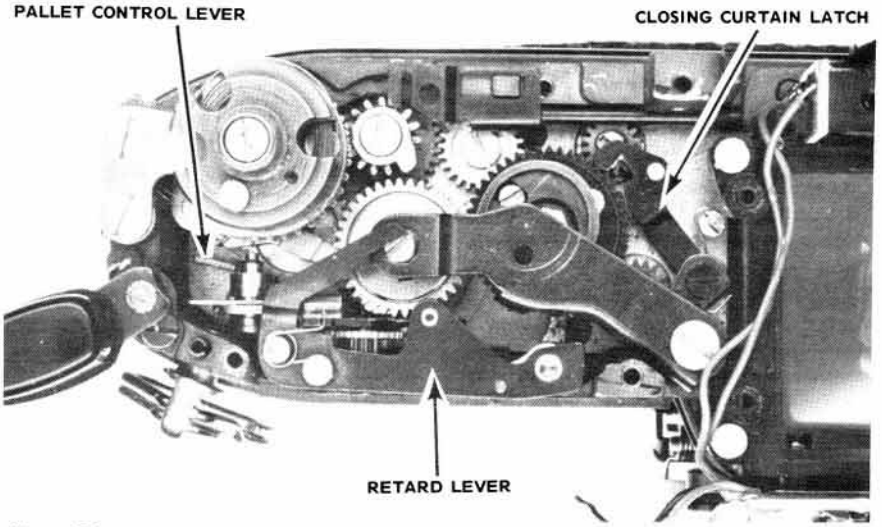


Figure 20

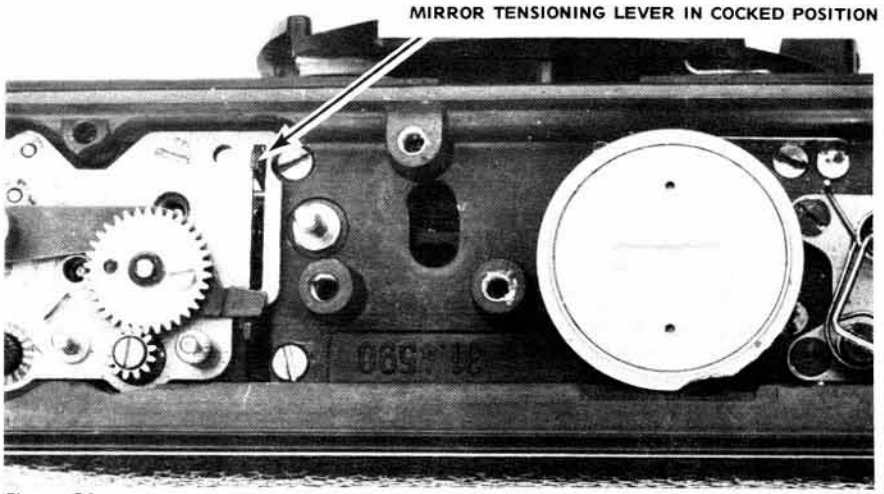


Figure 21

focusing screen adjustment), the viewfinder masks, and the Fresnel lens.

Going now to the bottom of the camera, remove the tripod socket, the exposure meter switch linkage (held by two E-rings), and the mirror return lever (also held by two E-rings). Then, take out the release rod (another E-ring) with its compression spring.

Finally, remove the two screws holding the "X" contact assembly and the six mirror cage retaining screws: four screws at the bottom of the camera, and two locating screws at the top of the mirror cage. You'll still find, however, that the mirror cage doesn't want to come out of the camera body. But it'll come out easily with the mirror in the taking position, so cock the mirror by pushing the mirror tensioning lever toward the front of the camera, Fig. 21. And release the mirror by pushing down the mirror release lever, Fig. 22. You can now see the reason for removing the mirror return lever earlier in the disassembly — without the mirror return lever, the mirror remains in the taking position and you can lift out the mirror cage.

When replacing the mirror cage, you'll again want the mirror in the taking position. The reason is that the mirror lifting lever, Fig. 23, must be down to clear the camera body. Another reassembly precaution, this time while you're seating the mirror cage, is to assure that the opening curtain latch sits to the front of the opening curtain striker. Just hold the opening curtain latch toward the front of the camera (against the spring tension) as you install the mirror cage.

Conclusions on the SL35

The Rolleiflex SL35 looks like an SLR for the purist. Its price tag — $379 — reflects the quality built into the camera, as many of the frills common to today's SLR are missing. For example, the purist will appreciate the clean look to the focusing screen which doesn't reveal shutter speed or diaphragm settings. And he'll relish the light weight and trim lines.

What the SL35 lacks in trinkets, like film-type reminder dials and 20-36 exposure dials, it makes up for in genuine quality features — most of which can't be seen from the outside of the camera. For example, both the opening curtain tapes and the closing curtain tapes run on teflon rollers.

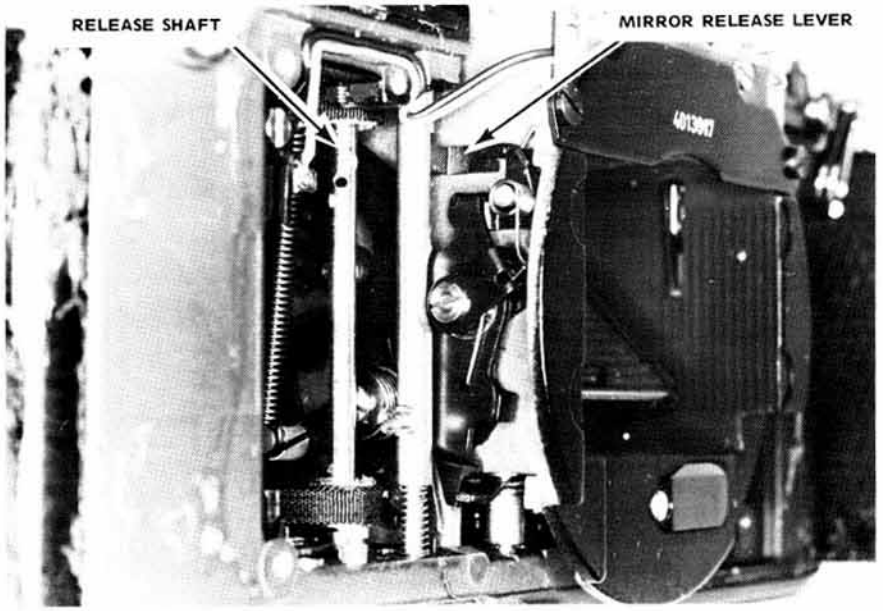


Figure 22

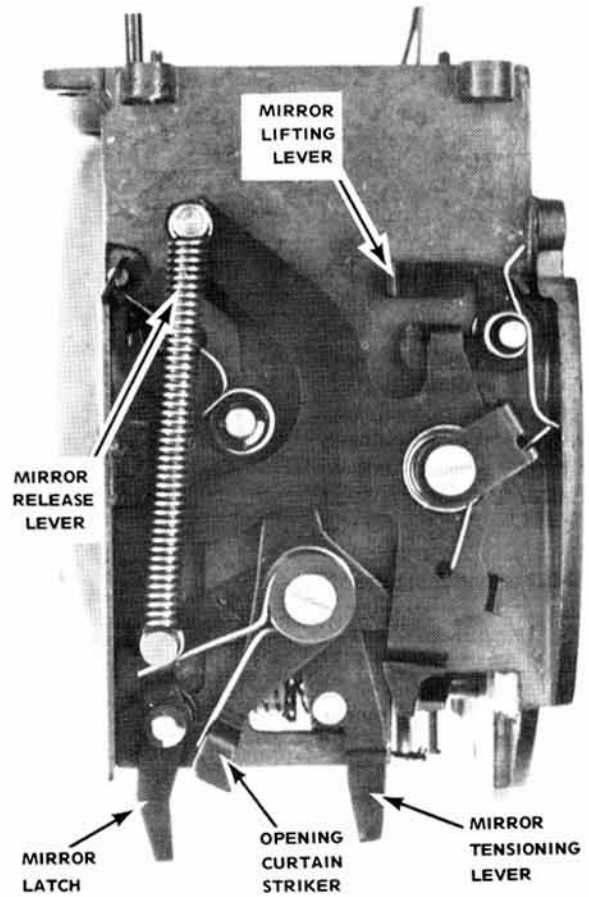


Figure 23

And, as shown in Fig. 24, both curtains are well cushioned by damping springs that contact the curtain bars.

From the technician's standpoint, the ample adjustment points provide a great advantage. Also, the critical parts are readily accessible with a minimum of disassembly. Timing procedures for the shutter curtains are, we feel, somewhat more difficult than in many double-roller designs because of the main wind shaft. The theory is still the same: time the closing curtain wind gear so that, when the gear is held by the closing curtain latch, the closing curtain bar aligns with a factory scribe mark at the opening side of the focal-plane aperture. And time the opening curtain wind gear for the one bar overlap during the cocking cycle. But timing the gears while trying to simultaneously seat the main wind shaft does complicate the whole procedure.

Beyond what we've mentioned, the general-theory design of the SL35 mirrors similar systems. The gear train release, for example, appears surprisingly familiar, Fig. 25. Advancing the wind lever turns the lower of the stacked intermediate gears. The lower gear then comes against the key to turn the upper gear, the gear which engages the opening curtain wind gear. Fig. 26 shows the timing of the upper intermediate gear when the shutter's in the released position.

As the curtains reach the cocked position, the latch shown in Fig. 26 drops into engagement with a notch in the lower intermediate gear — slightly before the opening curtain latch drops into engagement with the wind shaft cam. Pushing down the release then depresses the key to free the upper intermediate gear (in Figs. 24 and 25, we've removed the release shaft platform that comes against the key). Thus, once the mirror disengages the opening curtain latch, the opening curtain wind gear and the upper intermediate gear are free to rotate.

So working on your first Rolleiflex SL35 may not seem like a totally unique experience. But if you're inundated daily with gimmick-laden, do-everything cameras — and if you've been known to lament cost-cutting tricks in camera manufacture that make the equipment easier to buy but a headache to service — you'll find the experience a pleasant one. ◆

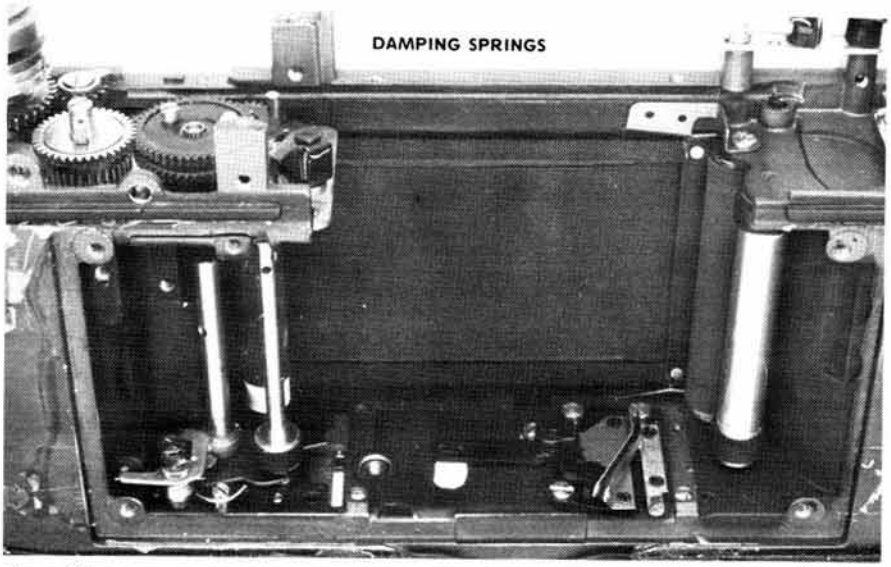


Figure 24

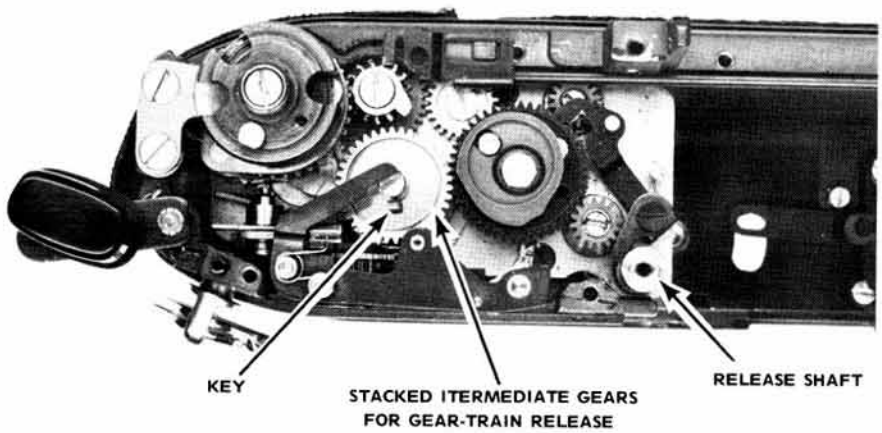


Figure 25

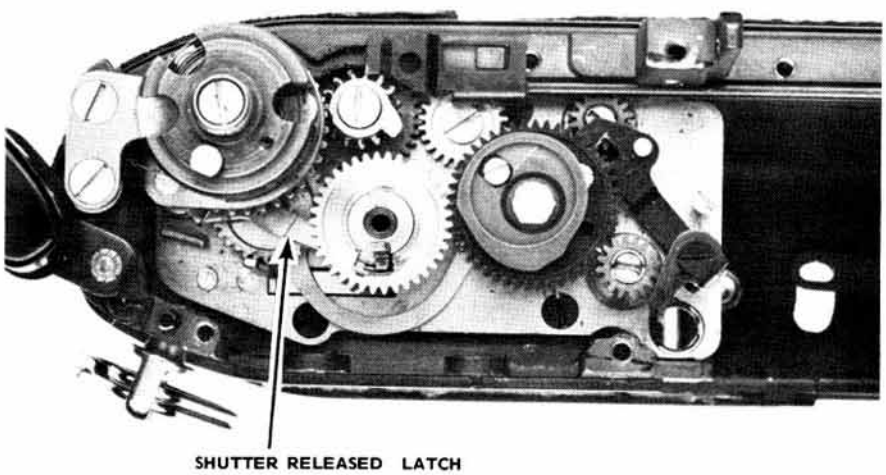


Figure 26